

Serial No. 10/601,030, Docket No. RA-5482
Examiner Peugh, Group Art Unit 2187

Amendment after Final
February 9, 2007

Please amend the Claims as follows:

- 1 1. (Currently Amended) For use in a system having multiple processors in a processing node coupled to a memory, a method, comprising:
 - 2 a.) receiving multiple requests for data from the multiple processors;
 - 3 b.) if ones of the multiple requests are requesting the same data, creating a respective linked list in the processing node to record the ones of the multiple requests according to order of receipt, the linked list being created without regard to types of the requests; and
 - 4 c.) issuing an oldest one of the requests recorded by each linked list from the processing node to the memory and:
 - 5 d.) receiving from the memory requests that are issued to the multiple processors requesting return of data to the memory, and if a request from memory is requesting the same data as requests recorded within a linked list, adding the memory request to the linked list.

2. (Cancelled)

3. (Cancelled)

- 1 4. (Original) The method of Claim 1, and further including:
 - 2 receiving requested data from the memory;
 - 3 if the received data was requested by requests recorded in a linked list,
 - 4 providing the received data to a processor that issued a predetermined one of the requests included in the linked list;
 - 5 removing the predetermined request from the linked list; and
 - 6 processing all requests remaining in the linked list.
- 1 5. (Original) The method of Claim 4, wherein the predetermined request is the
2 oldest-pending request in the linked list.

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1 6. (Original) The method of Claim 4, wherein the processing step includes:
2 making the next request in the linked list the current request;
3 requesting return of the received data from whichever one of the multiple
4 processors last retained the data;
5 providing the received data to whichever one of the multiple processors is
6 indicated by the current request; and
7 removing the current request from the linked list.

1 7. (Original) The method of Claim 6, wherein the memory issues memory
2 requests to the multiple processors for the return of data to the memory, wherein
3 a memory request requesting the same data as requests recorded by a linked list
4 is added to the linked list, and wherein the providing step includes providing the
5 received data to the memory if the memory is indicated by the current request.

1 8. (Original) The method of Claim 7, wherein a shared cache is coupled to the
2 multiple processors, and further including:
3 attempting to retrieve the received data from the shared cache; and
4 if, in response to the requesting step, none of the multiple processors
5 returns the received data, the providing step includes providing any data
6 retrieved from the shared cache to whichever one of the multiple processors or
7 the memory is indicated by the current request.

1 9. (Original) The method of Claim 8, wherein if, in response to the requesting
2 step, none of the multiple processors returns the received data, and if the
3 received data is not resident in the shared cache, indicating the current request
4 must be retried.

1 10. (Original) The method of Claim 9, wherein the step of receiving requested
2 data from the memory occurs before all invalidation operations are completed for
3 the received data, and further including preventing predetermined data from

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4 being provided to the memory until predetermined invalidation operations are
5 completed.

1 11. (Original) The method of Claim 6, wherein the requesting and providing steps
2 of Claim 6 are performed during an indivisible operation.

1 12. (Currently Amended) A method of processing requests generated by
2 requesters and provided to a memory, including:
3 a.) receiving a request for data stored in the memory;
4 b.) if the request is requesting the same data as another pending request
5 that has not yet been provided from the requesters to the memory, linking the
6 request to the other pending request without regard to types of the requests and
7 before either of the requests is provided by the requesters to the memory; and
8 c.) repeating steps a.) and b.) for any additional requests issued to the
9 memory to create multiple linked lists of requests, each respectively associated
10 with different data;

11 d.) when data for a pending request is received from the memory,
12 providing the data to a requester that issued the pending request;
13 e.) if the pending request is linked to another request, requesting that the
14 data be returned by a requester indicated by the pending request so that the
15 other linked request may be processed;
16 f.) providing the data to satisfy the other linked request;
17 g.) making the other linked request the current request;
18 h.) if the current request is linked to another request, requesting that the
19 data be returned by a requester that most recently retained the data;
20 i.) repeating steps f.) through h.) for each of the additional requests in the
21 linked list; and
22 wherein at least one of steps e.) and h.) includes requesting that the data
23 is returned with predetermined access rights that are based on a type of the
24 current request and the linked request.

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1 13. (Cancelled)

1 14. (Cancelled)

1 15. (Cancelled)

1 16. (Cancelled)

1 17. (Cancelled)

1 18. (Currently Amended) The method of Claim 16, A method of processing
2 requests generated by requesters and provided to a memory, including:
3 a.) receiving a request for data stored in the memory;
4 b.) if the request is requesting the same data as another pending request
5 that has not yet been provided from the requesters to the memory, linking the
6 request to the other pending request without regard to types of the requests and
7 before either of the requests is provided by the requesters to the memory;
8 c.) repeating steps a.) and b.) for any additional requests issued to the
9 memory to create multiple linked lists of requests, each respectively associated
10 with different data;
11 d.) when data for a pending request is received from the memory,
12 providing the data to a requester that issued the pending request;
13 e.) if the pending request is linked to another request, requesting that the
14 data be returned by a requester indicated by the pending request so that the
15 other linked request may be processed;
16 f.) providing the data to satisfy the other linked request;
17 g.) making the other linked request the current request;
18 h.) if the current request is linked to another request, requesting that the
19 data be returned by a requester that most recently retained the data;
20 i.) repeating steps f.) through h.) for each of the additional requests in the
21 linked list; and

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22 wherein at least one of steps e.) and h.) include requesting that the data is
23 returned with predetermined access rights based on rights that were granted by
24 the memory for the data.

1 19. (Currently Amended) The method of Claim [16] 18, wherein at least one of
2 steps e.) and h.) is performed in a manner that is determined programmably.

1 20. (Currently Amended) A system for processing requests to a memory,
2 comprising:

3 multiple requesters to issue requests for data; and
4 a request tracking circuit to retain a record of each request until the
5 request is completed, and to the requesting tracking circuit including:
6 a storage device to store linked lists, each linked list to associate a
7 request with any other one or more requests for the same data irrespective of
8 types of the requests so that a single request from the multiple requesters for any
9 given data is pending within the memory at a given time; and

10 a control circuit

11 to receive data from the memory in response to a request
12 that has been associated with other requests;

13 to provide the received data to whichever requester issued
14 the oldest one of the associated requests for the received data as determined by
15 information stored within the storage device;

16 to process each of the other associated requests for the
17 received data in the order in which the requests were recorded by the request
18 tracking circuit by attempting to obtain the received data from one of the multiple
19 requesters;

20 to provide any obtained data to a requester that is identified
21 by the request that is being processed; and

22 to cause a requester to reissue a request if, during
23 processing of a request, data requested by the request could not be obtained.

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21. (Cancelled)

22. (Cancelled)

23. (Cancelled)

24. (Cancelled)

25. (Cancelled)

1 26. (Currently Amended) The system of Claim 24, wherein the request tracking
2 circuit includes A system for processing requests to a memory, comprising:
3 multiple requesters to issue requests for data; and
4 a request tracking circuit to retain a record of each request until the
5 request is completed, the requesting tracking circuit including:
6 a remote tracker circuit to store a record of a request received from
7 the memory that is requesting that same data as one or more requests recorded
8 within the request tracking circuit;
9 a storage device to store linked lists, each to associate a request
10 with any other one or more requests for the same data irrespective of types of
11 the requests so that a single request from the multiple requesters for any given
12 data is pending within the memory at a given time; and
13 a control circuit
14 to receive data from the memory in response to a request
15 that has been associated with other requests;
16 to provide the received data to whichever requester issued
17 the oldest one of the associated requests for the received data as determined by
18 information stored within the storage device;
19 to process each of the other associated requests for the
20 received data in the order in which the requests were recorded by the request

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21 tracking circuit by attempting to obtain the received data from one of the multiple
22 requesters; and
23 to provide any obtained data to a requester that is identified
24 by the request that is being processed.

1 27. (Currently Amended) The system of Claim [25] 20, wherein the control
2 circuit includes a circuit to process the request from memory by attempting to
3 obtain the requested data, then providing any obtained data to the memory.

1 28. (Currently Amended) The system of Claim 23,A system for processing
2 requests to a memory, comprising:
3 multiple requesters to issue requests for data; and
4 a request tracking circuit to retain a record of each request until the
5 request is completed, the requesting tracking circuit including:
6 a storage device to store linked lists, each to associate a request
7 with any other one or more requests for the same data irrespective of types of
8 the requests so that a single request from the multiple requesters for any given
9 data is pending within the memory at a given time; and
10 a control circuit
11 to receive data from the memory in response to a request
12 that has been associated with other requests;
13 to provide the received data to whichever requester issued
14 the oldest one of the associated requests for the received data as determined by
15 information stored within the storage device; and
16 to process each of the other associated requests for the
17 received data in the order in which the requests were recorded by the request
18 tracking circuit;
19 wherein the memory provides data to the request tracking circuit before
20 all invalidation operations for the data have been completed, and wherein the
21 request tracking circuit includes a circuit to prevent predetermined data retained

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22 by predetermined ones of the multiple requesters from being returned to the
23 memory before all of the invalidation operations are completed.

1 29. (Currently Amended) A data processing system comprising:
2 a memory;
3 a processing node coupled to the memory and having ~~one or more~~
4 ~~requesters~~multiple processors to generate requests for data to the memory,
5 wherein the processing node includes a requesting tracking circuit to associate
6 requests issued for the same data irrespective of request types, and to allow only
7 one of the requests for the same data from being issued to the memory at a
8 given time; and
9 a control circuit included in the processing node to receive data returned
10 from the memory, to provide the data to the processor associated with the oldest
11 request pending for the data, to determine whether other requests are pending
12 for the received data, and for each of the other pending requests, to process the
13 pending requests in order of receipt by attempting to obtain the data from
14 whichever of the multiple processors last retained the data, and to then provide
15 any obtained data to a processor that is associated with the request being
16 processed, the control circuit further to store programmable data to indicate the
17 manner in which the data is to be obtained from a processor based on access
18 rights retained by the processor for the data and the access rights requested by
19 the processor associated with the request being processed.

30. (Cancelled)

1 31. (Cancelled)

32. (Cancelled)

33. (Cancelled)

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1 34. (Currently Amended) A system for processing requests to a memory,
2 including:
3 processing means for originating the requests to the memory; and
4 request tracking means for receiving the requests, and for forming an
5 association between any of the requests that are requesting the same data
6 irrespective of types of the requests, the association between requests recording
7 an order of receipt of the requests, and for allowing only one of the associated
8 requests to be provided from the processing means to the memory; and
9 control means included in the request tracking means for receiving data
10 from the memory along with access rights required to process the request, and if
11 the received data was requested by associated requests that are requesting the
12 same data, for processing each of the associated requests in the order in which
13 the requests were received by providing the data to the processing means along
14 with the required access rights.

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)